(Translation)

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[NAME OF DOCUMENT] SPECIFICATION
[TITLE OF THE INVENTION] TELEVISION RECEIVER
[SCOPE OF CLAIMS FOR PATENT]

[Claim 1] A television receiver comprising:

program information storage means for storing television program information including broadcast station data, broadcast date and time data, and program type data;

a clock circuit;

flag setting means for setting an end flag to program information of a program which broadcasting is finished and setting an in-broadcasting flag to program information of a program which is currently being broadcasted according to timing data of the clock circuit and the broadcast date and time data stored in the program information storage means;

instructing means for instructing program information search; and

search means for searching the program information storage means while referencing the flag set by the flag setting means according to the instruction of the instructing means.

[DETAILED DESCRIPTION OF THE INVENTION]

[Technical Field of the Invention]

The present invention relates to a television receiver with a television program information display function.

[Prior Art]

The television receivers are currently being widely used in most households, and the audience rating is very high. In each household having a television receiver, it is common for one to want to watch the news or watch the weather forecast. It is also common for one to want to watch movies or watch baseball games. When one desires to watch a specific program, the channel can be selected by reading the television schedule in the newspaper, but the newspaper may not be at hand or it might be troublesome to read the newspaper. This is significant with a portable television when one is outside. As means for solving such problems, consideration is made in providing a program memory, storing the television program information in

the program memory in advance, and searching the desired program or displaying the program table of a specified type on a television screen. In this case, it takes a long time to search for all the program information which is stored in the program memory in order. Furthermore, there is no point in displaying the program names which broadcasting have already finished.

[Problems to be Solved by the Invention]

In view of the above problems, it is an object of the present invention to provide a television receiver capable of searching the program information stored in the program memory in advance and displaying the program table of the specified type on a television screen, and capable of efficiently performing the search for the program information on the program memory.

[Means for Solving the Problems]

The present invention relates to a television receiver including program information storage means for storing television program information including broadcast station data, broadcast date and time data, program type data, and the like; and a clock circuit for timing a current date and time; where an end flag is set with respect to the program information of the program which broadcasting is finished and the in-broadcasting flag is set for the program information of the program which is currently being broadcasted according to the timing data of the clock circuit and the broadcast date and time data stored in the program information storage means, and the search for the program information is performed while referencing the broadcast end flag and the in-broadcasting flag when the instruction of the program search is provided.

[Embodiments of the Invention]

One embodiment of the present invention will now be described with reference to the drawings. This example shows that the television program information is stored in the program memory using a tele-soft of a character diagram information system (videotex), and the television program information stored in this program memory is displayed on the CRT screen in accordance with the predetermined key operation. First, the outer appearance of a television receiver will be described using Fig. 2. In Fig. 2, 1 is a housing of the television receiver, where a television receiving circuit and a receiving

circuit of a character diagram information system (videotex), to be hereinafter described in detail, are arranged in the housing 1. The housing 1 has the front side of the upper part formed to an inclined manner, and a keyboard 2 is arranged at the relevant portion. A CRT display part 3 is arranged on the upper part of the housing 1 and a telephone mounting unit 4 is formed next thereto, where a telephone 5 is mounted on the telephone mounting unit 4.

The configuration of a television receiving circuit 10 and a receiving circuit 20 of the character diagram information system shown in detail in Fig. 1 will now be described. In Fig. 1, 12 is a tuner in the television receiving circuit 10 which selects a broadcast wave of a desired channel according to an instruction of an auto-channel circuit 13 from the television broadcast waves induced by an antenna 11, converts the broadcast wave to an intermediate frequency, and outputs the converted intermediate frequency to a TV circuit 14. The TV circuit 14 amplifies a television signal transmitted from the tuner 12, and then performs processes such as image detection, synchronous separation, voice detection, and the like, and outputs the image signal to the CRT display part 3 via a display switching circuit 15 and outputs the voice signal to a speaker (not shown). The TV circuit 14 also creates a tuning signal with the signal from the tuner 12, and outputs the created signal to the auto-channel circuit 13. 16 is a program memory for storing the television program information, and a search circuit 17 and a flag control circuit 18 are connected to the program memory 16. 19 is a clock circuit which times the date and the time, and outputs the date of the current day and the current time data to the search circuit 17 and the flag control circuit 18. The flag control circuit 18 performs rewrite control of a flag in the program memory 16 such as a flag for program in broadcasting, program ending, and the like according to the time data from the time circuit 19. The search circuit 17 searches the content of the program memory 16 according to the instruction from the keyboard 2 in the receiving circuit 20 of the character diagram information system, and outputs a channel selection signal to the auto-channel circuit 13.

The aforementioned program memory 16, for example, stores program information for one month, and the address area is

divided into date units where each has a head address (X address) being set. Figure 3 shows a configuration of some area (May 12) of the program memory 16. Herein, the following features are set as the program information: date, channel, day, start time, end time, type of program, a flag F1 which shows that the program is on the air, a flag F2 which shows that the program has finished, program name, and the like. Regarding these programs, those which are continuously outputted from the information center of videotex by tele-soft are written onto the character diagram information center system via a receiving circuit 20.

On the other hand, in the receiving circuit 20 of the character diagram information system, a telephone line (not shown) is connected to a line control unit 21 by way of a terminal 22. The telephone 5 is connected to the line control unit 21, and a videotex controller 25 is connected to the line control unit 21 by way of a modem 23 and a modem controller 24. Furthermore, the keyboard 2, a display memory 26, and a work memory 27 are connected to the videotex controller 25, and a printer 29 is connected to the videotex controller 25 by way of a print memory 28. The display memory 26 is a memory for storing received images of the videotex, and the stored data are transmitted to the CRT display part 3 via the display switching circuit 15. When the television program information is read from the information center of the videotex by tele-soft according to the instruction from a key board 2, the aforementioned videotex controller 25 outputs the television program information to the television receiving circuit 10 to store in the program memory 16. Furthermore, when the program type is specified with the keyboard 2, the videotex controller 25 outputs a type code and a search command to the search circuit 17.

The details of the search circuit 17 in Fig. 1 will now be described in detail using Fig. 4. In Fig. 4, 171 is an address generation circuit, where the address generation circuit 171 is provided with date data from the clock circuit 19 and is provided with the program search command from the keyboard 2 via the videotex controller 25 in Fig. 1. The address generation circuit 171 operates according to the search command from the keyboard 2, generates address data X according to the

date data provided by the clock circuit 19, and sets the address data X in an address register 172. The head address of the date area of the program memory 16 shown in Fig. 1 is specified by the address data X set in the address register 172. Information for one program, that is, "date", "channel", "day of the week", "start time", "end time", "type", "flag F1", "flag F2", and "program name" are read out according to the specified address, and are written in a buffer 173. Among the information written in the buffer 173, the "channel" information is input to a channel voltage generation circuit 174, the "type" information indicating the program type is input to a type code comparison circuit 175, and the "flag F1" is input to a flag determination circuit 176. The flag determination circuit 176 determines whether the in-broadcasting flag F1 read out to the buffer 173 is "1" or "0", and outputs "+1" signal to the address register 172 via an OR circuit 177 if "0", and outputs a comparison command to the type code comparison circuit 175 if "1". A code indicating the type of program input from the keyboard 2 via the videotex controller 25 is also provided to the type code comparison circuit 175 via a type code register 178. The type code comparison circuit 175 matches and compares the type code read out to the buffer 173 and the type code input to the type code register 178 when "1" signal is provided from the flag determination circuit 176, and outputs a match signal to the channel voltage generation circuit 174 when the codes match, and outputs a mismatch signal to the address register 172 via an OR circuit 177 when the codes do not match. When the match signal is provided from the type code comparison circuit 175, the channel voltage generation circuit 174 generates a channel voltage according to the channel information provided from the buffer 173 and outputs the channel voltage to the auto-channel circuit 13 of Fig. 1.

Next, the operation of the aforementioned example is described. Preceding the search operation of the television program, as shown in the flow chart of Figure 5, for example, the television program information for one month is read from the information center of the videotex by tele-soft to store in the program memory 16 of the television receiving circuit 10. Namely, the user firstly, as shown in Step A1 of Figure 5, designates the videotex mode by the key operation of the

keyboard 2. Then the information center of the videotex is called by the telephone 5, and as shown in step A2, for example, the television program information for one month (that is, television program information containing broadcast station data, broadcast time data, and data of type of program) is received by tele-soft. In the aforementioned videotex mode, the display switching circuit 15 is switched to the display memory 26 side, and the received image of videotex stored in the display memory 26 is displayed on the CRT display part 3. However, if the television program information is sent from the information center as a tele-soft, the videotex controller 25 stores the television program information in the program memory 16 in Step A3. Thereafter, the videotex controller 25 transmits a command to the search circuit 17 to execute an initial process, whose detail is shown in Fig. 6, in step A4, and terminates the process of receiving the program information.

The details of the initial process of step A4 will be described using Fig. 6. The search circuit 17 first sets the specified address N of the program memory 16 as "1" (head address) as shown in step A11 of Fig. 6, and reads out the content of the specified address from the program memory 16 in step A12. As shown in step A13, the date of the program read out from the program memory 16 and the current date (current day) timed by the clock circuit 19 are compared, where if the current date is larger, that is, if the airdate is before yesterday and the broadcasting is already finished, the process proceeds to step A14 to set the broadcast end flag F2, and proceeds to step A16. If the current date and the date of the program match, the process proceeds from step A13 to step A15 to determine whether or not the current time timed by the clock circuit 19 is after the end time of the program, where if the current time is after the end time of the program, the process proceeds to step A14 to set the broadcast end flag F2. If the current time is before the end time, the process proceeds from step A15 to step A16. If the current date is smaller than the date of the program in step A13, that is, if determined that the program is not yet broadcasted, the process proceeds to step A16. In step A16, whether or not the specified address N of the program memory 16 has reached an last address is determined, where if the last address has not been reached, "+1" is added to the specified

address N in step A17, and the process returns to step A12. Similar process is repeated, and the program information is sequentially read out from the program memory 16, whether or not the broadcasting of the relevant program is finished is determined, and the broadcast end flag F2 is set for the program which broadcasting is finished. When the specified address N of the program memory 16 has reached the last address, such state is detected in step A16, and the initial process is terminated. The last address N may be fixed, or the initial process may be terminated when the end code is read out from the program memory 16.

As described above, the television program information is stored in the program memory 16, and after the initial process is terminated, the type of an arbitrary program is specified through key operation of the keyboard 2 to perform an automatic search. When searching the television program, the mode is switched to a TV mode through the key operation of the keyboard 2 as shown in step B1 of Fig. 7, and a "program" key is operated. When switched to the TV mode, the videotex controller 25 constantly checks the operation of the "program" key as shown in step B2, where if the "program" key is not operated, an input standby state with respect to other keys is obtained and the normal TV reception state is obtained, and the image signal output from the TV circuit 14 is displayed on the CRT display part 3. If the "program" key is operated, the videotex controller 25 proceeds from step B2 to step B3, and displays a program menu on the CRT display part 3. As shown in Fig. 8, the program menu of "news", "weather forecast", "baseball", "sports", "movie", "education", "drama", "song", "cartoon", "quiz", "long" (long program), "skit" and the like are displayed on the CRT display part 3 with a correspondence number. The user specifies the correspondence number of the desired program from the program menu displayed on the CRT display part 3 through the key operation of the keyboard 2 as shown in step B4. After the program specifying number is input, the videotex controller 25 outputs the type code and the search command of the specified program to the search circuit 17 as shown in step B5, and thereafter, maintains the relevant state until the search is completed in step B6. After the search operation of the search circuit 17 is terminated and the specified station is selected,

the videotex controller 25 obtains the other key input standby state and the normal TV reception state, and image displays the program of the station selected in the search circuit 17 on the CRT display part 3.

The detailed operation of the search circuit 17 and the flag control circuit 18 will now be described. In Fig. 1, an operation voltage is constantly supplied to the program memory 16, the search circuit 17, the flag control circuit 18, and the clock circuit 19 regardless of whether the power supply is turned ON/OFF. The clock circuit 19 constantly performs a timing process of the current time and the current date, and provides the current time information and the date information of the current day to the search circuit 17 and the flag control circuit 18. The flag control circuit 18 performs a rewrite control of the flags F1, F2 of the program information stored in the program memory 16 based on the time information from the clock circuit 19. Fig. 9 shows a flowchart of a rewrite process of the flags F1, F2, and the operation will be described below according to the relevant flowchart. As shown in step C1 of Fig. 9, the flag control circuit 18 performs a detection process of a one-minute pulse transmitted from the clock circuit 19, and if the one-minute pulse is detected, proceeds to step C2 to read the date data from the clock circuit 19. The flag control circuit 18 generates a head address X and an last address X_{END} with respect to the corresponding date area of the program memory 16 according to the date data read from the clock circuit 19 as shown in step C3. The flag control circuit 18 then sets the specified address N with respect to the program memory 16 as the head address X as shown in step C4, and reads out the stored content of the program memory 16 in step C5. In step C6, the flag control circuit 18 determines whether or not the broadcast end flag F2 is set, proceeds to step C7 if the flag F2 is not set, and determines whether the current time is after the broadcast start time. If the current time is after the broadcast start time, the process proceeds to step C8 to determine whether or not the current time has reached the broadcast end time, where if the current time has not reached the broadcast end time, that is, if currently in-broadcasting, the in-broadcasting flag F1 is set in step C9. However, if the current time has reached the broadcast end time, the process

proceeds from step C8 to step C10, and the broadcast end flag F2 is set and the in-broadcasting flag F1 is reset. When the process of step C9 or step C10 is terminated, or when determined that the broadcast end flag F2 is set (broadcasting is finished) in step C6, and when determined that the current time has not reached the broadcast start time in step C7, the process proceeds to step C11 to determine whether or not the memory specified address N has reached the last address, where if the last address is not yet reached, "+1" is added on the memory specifying address N in step C12 and the process returns to step C5. Similar operation is repeatedly performed, where the in-broadcasting flag F1 is set if the program is in broadcasting, and the broadcast end flag F2 is set if the broadcasting is finished. After the process on the date area of the current day of the program memory 16 is terminated and the determination result of step C11 becomes YES, the process returns to step C1 and waits until the next one-minute pulse is transmitted from the clock circuit 19. The rewrite control of the in-broadcasting flag F1 and the broadcast end flag F2 is performed every time the one-minute pulse is output from the clock circuit 19.

The rewrite of the flags F1, F2 of the program memory 16 is constantly performed by the flag control circuit 18, but when the program type is specified through the key operation of the keyboard 2 as described above and the type code and the search command are output from the videotex controller 25 to the search circuit 17 in step B5 of Fig. 7, the search circuit 17 starts the search process of the program. In other words, the type code transmitted from the videotex controller 25 to the search circuit 17 is set in the type code register 178, and the search command is input to the address generation circuit 171. When the search command is provided, the address generation circuit 171 generates the head address X of the date area of the program memory 16 according to the date information from the clock circuit 19, and sets the same in the address register 172. The head address X of the date area of the program memory 16 is specified by the data set in the address register 172, and the information for one program at the specified address is read out from the program memory 16 to the buffer 173. After the program information is read out to the buffer 173, the

in-broadcasting flag F1 is first transmitted to the flag determination circuit 176, and the content thereof is determined. If the program read out to the buffer 173 is not in broadcasting, the in-broadcasting flag F1 is "0", in which case, "+1" signal is output from the flag determination circuit 176 via the OR circuit 177, and "+1" is added to the content of the address register 172. The next address of the program memory 16 is thereby specified, and the program information stored in the relevant address is read out to the buffer 173. Similar to the above, the content of the in-broadcasting flag F1 is determined in the flag determination circuit 176. If the in-broadcasting flag F1 is "0", the operation similar to the above is repeated, but if the flag F1 is "1", that is, if the program is in-broadcasting, "1" signal is transmitted from the search circuit 17 to the type code comparison circuit 175. When the "1" signal is provided from the flag determination circuit 176, the type code comparison circuit 175 compares the type code held in the buffer 173 at the relevant moment and the type code held in the type code register 178, where if the codes do not match, that is, if the program read out to the buffer 173 is not the program specified by the keyboard 2, the mismatch signal is output to the address register 172 via the OR circuit 177. As a result, "+1" is added to the content of the address register 172, the next address of the program memory 16 is specified, and the content thereof is read out to the buffer 173. When the new program information is set in the buffer 173, the in-broadcasting flag F1 and the type code are checked in the above manner. If the type code held in the buffer 173 and the type code held in the type code register 178 match, the match signal is transmitted from the type code comparison circuit 175 to the channel voltage generation circuit 174. In other words, if, for example, "news" is specified as the program type by the keyboard 2, the match signal is output from the type code comparison circuit 175 and transmitted to the channel voltage generation circuit 174 when the program of "news" that is currently in broadcasting is read out to the buffer 173 from the program memory 16. When the type code match signal is provided, the channel voltage generation circuit 174 generates a voltage corresponding to the channel code held in the buffer 173, and outputs the voltage to the auto-channel circuit 13.

When supplied with the channel voltage from the voltage generation circuit 174, the auto-channel circuit 13 controls the receiving frequency of the tuner 12 according to the channel voltage, and selects the station of the specified channel. When the program type is specified by the keyboard 2 in the above manner, the channel broadcasting the relevant program is selected and image is displayed on the CRT display part 3. If none of the stations is broadcasting the program of the specified type such as "news", the station selected at the relevant point is continuously received. If the program of the specified type is being broadcasted simultaneously at two or more stations, the station of corresponding to the channel having the lowest number is received.

Next, the operation of when the program table stored in the program memory 16 is displayed on the CRT display part 3 will be described. Although the display of the aforementioned program table is designated by a key operation of the keyboard 2, the program table to be displayed, as shown in Figure 10, can be designated as:

(1) program table for all programs which will be broadcasted hereafter

(2) program table for one designated day

(3) list of programs of a designated genre (type) which will be broadcasted hereafter

(4) list of programs of a designated channel which will be broadcasted hereafter

(5) program table for one designated day of the week (nearest day of the week)

(6) program table for programs on the air.

When displaying the aforementioned program tables of 1-6, for example, as shown in Figure 10, (1) is designated by a single operation D of only the "program table" key, (2) is designated by a combined operation E of input of "date" and the "program table" key, (3) is designated by a combined operation F of the designation of "type" of program and the "program table" key, (4) is designated by a combined operation G of the designation of "channel" and the "program table" key, (5) is designated by a combined operation H of the designation of the "day" and the "program table" key, and (6) is designated by a single operation I of the "in-broadcasting" key. When a display designation

operation of the aforementioned program table is performed by the keyboard 2, the videotex controller 25 executes the processes shown in Figures 11-16.

Figure 11 shows a process of the videotex controller 25 when displaying a program table for all programs which will be broadcasted hereafter of the aforementioned (1). When the key operation D with respect to (1) is performed with the keyboard 2, the videotex controller 25 first sets the specified address N of the program memory 16 as 1 (head address) in step D1, and reads out the content of the program memory 16 in step D2. As shown in step D3, determination is made on whether or not the date of the current day and the date of the program match, where if the dates match, determination is further made on whether or not the current time has reached the end time of the program in step D4. If broadcasting of the program read out from the program memory 16 has not yet finished, the program information thereof is output to the work memory 27 in step D5, and the process thereafter proceeds to step D6. The process also proceeds to step D6 if determined that the dates do not match in step D3, and if determined that broadcasting of the program has finished in step D4. In step D6, determination is made on whether or not the specified address N of the program memory 16 has reached the last address, where if the last address has not been reached, the specified address N is updated in step D7, and the process returns to step D2. Similar processing operation is repeated, and only the program information which will be broadcasted hereafter is selected from the program information stored in the program memory 16 to be written in the work memory 27. Then, in Step D6, when it is determined that the designated address of the program memory 16 has reached the last address, the process proceeds to Step D8 where the program information stored in the work memory 27 is edited to be in a easily-read form. Then, as shown in Step D9, the aforementioned edited program information is written from the work memory 27 to the display memory 26, and further, sent from the display memory 26 to the CRT display part 3 to be displayed. Namely, the program table for all programs which will be broadcasted hereafter is displayed on the CRT display part 3.

Next, the operation when performing the combined key operation E of input of “date” and “program table” key for (2)

and displaying the program table for one day of the relevant day will be described using Fig. 12. When the key operation E with respect to (2) is performed with the keyboard 2, the videotex controller 25 first generates the head address X with respect to the date of the current day of the date area as the specified address N of the program memory 16 as shown in step E1 of Fig. 12, and reads out the content of the program memory 16 in step E2. After outputting the program information to the work memory 27 as shown in step E3, the process proceeds to step E4, and determination is made on whether or not the specified address N of the program memory 16 has reached the last address, where if the last address has not been reached, the specified address N is updated in step E5, and the process returns to step E2. Similar processing operation is repeated, and only the program information to be broadcasted on the specified day is selected from the program information stored in the program memory 16, and written to the work memory 27. If determined that the specified address of the program memory 16 has reached the last address of the date area in step E4, the process proceeds to step E6 and the program information stored in the work memory 27 is edited to an easily viewable form. Thereafter, as shown in step E7, the edited program information is written from the work memory 27 to the display memory 26, and furthermore, transmitted from the display memory 26 to the CRT display part 3 and displayed thereon. That is, the program table for one day of the specified day is displayed on the CRT display part 3.

The operation when performing the combined operation F of specification of program "type" and "program table" key in (3) and displaying a list of programs to be broadcasted in the future in the relevant genre will be described using Fig. 13. When the key operation F with respect to (3) is performed with the keyboard 2, the videotex controller 25 first sets the specified address N of the program memory 16 as 1 (head address) in step F1 of Fig. 13, and reads out the content of the program memory 16 in step F2. As shown in step F3, determination is made on whether or not the broadcast end flag F2 is "1" or "0", that is, whether or not broadcasting of the relevant program is finished, where if broadcasting is not finished, determination is further made on whether or not the type code

of the relevant program and the specified type code match in step F4. If the type code of the program and the specified type code match, the program information thereof is output to the work memory 27 in step F5, and the process thereafter proceeds to step F6. The process also proceeds to step F6 if determined that broadcasting of the program is already finished in step F3, and if determined that the type codes do not match in step F4. In step F6, determination is made on whether or not the specified address N of the program memory 16 has reached the last address, where if the last address has not been reached, the specified address N is updated in step F7, and the process returns to step F2. Similar processing operation is repeated, and only the program information of the specified type is selected from the program information stored in the program memory 16, and written to the work memory 27. If determined that the specified address of the program memory 16 has reached the last address in step F6, the process proceeds to step F8 and the program information stored in the work memory 27 is edited to an easily viewable form. Thereafter, as shown in step F9, the edited program information is written from the work memory 27 to the display memory 26, and furthermore, transmitted from the display memory 26 to the CRT display part 3 and displayed thereon. That is, a list of programs to be broadcasted in the future in the specified genre is displayed on the CRT display part 3.

The operation when performing the combined operation G of specification of "channel" and "program table" key in (4) and displaying a list of programs to be broadcasted in the future in the specified channel will be described using Fig. 14. When the key operation G with respect to (4) is performed with the keyboard 2, the videotex controller 25 first sets the specified address N of the program memory 16 as 1 (head address) in step G1 of Fig. 14, and reads out the content of the program memory 16 in step G2. As shown in step G3, determination is made on whether or not the broadcast end flag F2 is "1" or "0", that is, whether or not broadcasting of the relevant program is finished, where if broadcasting is not finished, determination is further made on whether or not the channel of the relevant program and the specified channel match in step G4. If the channel of the program and the specified channel match, the

program information thereof is output to the work memory 27 in step G5, and the process thereafter proceeds to step G6. The process also proceeds to step G6 if determined that broadcasting of the program is already finished in step G3, and if determined that the channels do not match in step G4. In step G6, determination is made on whether or not the specified address N of the program memory 16 has reached the last address, where if the last address has not been reached, the specified address N is updated in step G7, and the process returns to step G2. Hereafter, same process operations are repeated, and only the program information which will be broadcasted hereafter on the designated channel is selected from the program information stored in the program memory 16 to be written in the work memory 27. Then, in Step G6, when it is determined that the designated address of the program memory 16 has reached the last address, the process proceeds to Step G8 where the program information stored in the work memory 27 is edited to be in a easily-read form. Then, as shown in Step G9, the aforementioned edited program information is written from the work memory 27 to the display memory 26, and further, sent from the display memory 26 to the CRT display part 3 to be displayed. Namely, a list of programs which will be broadcasted hereafter on the designated channel is displayed on the CRT display part 3.

The operation of performing the combined operation H of the "day of the week" input and the "program table" key in (5) and displaying a program table for one day of the closest specified day of the week will be described using Fig. 15. When the key operation H with respect to (5) is performed with the keyboard 2, the videotex controller 25 first determines whether or not a current day of the week and a specified day of the week match as shown in step H1 of Fig. 15, where if the day of the week match, the process proceeds to step H2, generates the head address X with respect to the date of the current day of the date area of the program memory 16, and reads out the content of the program memory 16 in step H3. After the program information thereof is output to the work memory 27 as shown in step H4, the process proceeds to step H5, determination is made on whether or not the specified address N of the program memory 16 has reached the last address of the date area, where if the last address has not been reached, the specified address

N is updated in step H6, and the process returns to step H3. Similar processing operation is repeated, and only the program information to be broadcasted on the specified day of the week, in this case the current day, is selected from the program information stored in the program memory 16, and written to the work memory 27. If determined that the specified address of the program memory 16 has reached the last address of the date area in step H5, the process proceeds to step H7 and the program information stored in the work memory 27 is edited to an easily viewable form. Thereafter, in step H8, the edited program information is written from the work memory 27 to the display memory 26, and furthermore, transmitted from the display memory 26 to the CRT display part 3 and displayed thereon. That is, a program table for one day of the specified day of the week is displayed on the CRT display part 3.

If determined that the current day of the week and the specified day of the week are different in step H1, the process proceeds to step H9 to calculate the date of the relevant day of the week that is close, and generates a head address X' corresponding to the date as the specified address N of the program memory 16 in step H10. Thereafter, processes similar to steps H3 to H6 are repeatedly performed in steps H11 to H14. If determined that the specified address has reached the last address X'_{END} in step H13, the process proceeds to step H7, the editing process is performed, the edited program information is output to the display memory 26, and displayed on the CRT display part 3 as shown in step H8.

The operation when performing the key operation I of "in-broadcasting" in (6) and displaying the program table currently being broadcasted will be described using Fig. 16. When the key operation I with respect to (6) is performed with the keyboard 2, the videotex controller 25 first generates the head address X with respect to the date of the relevant day as the specified address N of the program memory 16 as shown in step I1 of Fig. 16, and reads out the content of the program memory 16 in step I2. As shown in step I3, determination is made on whether or not the in-broadcasting flag F1 is "1" or "0", that is, whether or not the program is being broadcasted, where if the program is being broadcasted, the program information thereof is output to the work memory 27 in step I4,

and the process thereafter proceeds to step I5. If determined that the program is not being broadcasted in step I3, the process immediately proceeds to step I5 without performing the process of I4. In step I5, determination is made on whether or not the specified address N of the program memory 16 has reached the last address, where if the last address has not been reached, the specified address N is updated in step I6, and the process returns to step I2. Similar processing operation is repeated, and only the program information currently being broadcasted is selected from the program information stored in the program memory 16, and written to the work memory 27. If determined that the specified address of the program memory 16 has reached the last address of the date area of the relevant day in step I5, the process proceeds to step I7 and the program information stored in the work memory 27 is edited to an easily viewable form. Thereafter, as shown in step I8, the edited program information is written from the work memory 27 to the display memory 26, and furthermore, transmitted from the display memory 26 to the CRT display part 3 and displayed thereon. That is, a list of programs currently being broadcasted is displayed on the CRT display part 3.

Moreover, in the aforementioned example, when the program table cannot be displayed on one screen, the program table can be moved to the next page by scrolling or by displaying per day or per channel and performing a specific key operation such as a return key and the like.

In the above embodiment, information on cast members may be included in the program information to be stored in the program memory 16, so that a list of certain programs with the specified cast member can be displayed.

[Effect of the Invention]

As described in detail above, according to the present invention, the program information storage means for storing television program information including broadcast station data, broadcast date and time data, program type data, and the like, as well as the clock circuit for timing the current date and time are provided, a broadcast end flag is set with respect to the program information of the program which broadcasting is finished and the in-broadcasting flag is set with respect to the program information of the program which is currently

being broadcasted according to the timing data of the clock circuit and the broadcast date and time data stored in the program information storage means, and the search for the program information is performed while referencing the broadcast end flag and the in-broadcasting flag when the instruction of the program search is provided, whereby the program of a specified type is searched from the program information stored in the program memory in advance and displayed on the television screen, the state of the program can be easily recognized with the flags, and the search of the program information on the program memory can be efficiently performed.

[Brief Description of Drawings]

The figures show one embodiment of the present invention, in which

Fig. 1 is a block diagram showing a circuit configuration;

Fig. 2 is a perspective view showing an outer appearance configuration;

Fig. 3 is a view showing an example of information stored in a program memory;

Fig. 4 is a block diagram showing details of a search circuit in Fig. 1;

Fig. 5 is a flowchart showing a receiving operation of the program information;

Fig. 6 is a flowchart showing details of an initial process in Fig. 5;

Fig. 7 is a flowchart showing a search operation of the program;

Fig. 8 is a view showing a display example of a program menu;

Fig. 9 is a flowchart showing a flag rewrite process with respect to the program memory;

Fig. 10 is a view showing a key operation example for specifying and displaying various program tables;

Fig. 11 is a flowchart showing a processing operation for displaying all the program tables to be broadcasted in the future;

Fig. 12 is a flowchart showing a processing operation for displaying a program table of a specific day;

Fig. 13 is a flowchart showing a processing operation for

displaying a list of programs of a specific type;

Fig. 14 is a flowchart showing a processing operation for displaying a program table of a specific channel;

Fig. 15 is a flowchart showing a processing operation for displaying a program table of a specific day of the week; and

Fig. 16 is a flowchart showing a processing operation for displaying a program table currently being broadcasted.

[Description of the Reference Numerals]

1 Housing of television receiver
2 Keyboard
3 CRT display part
4 Telephone mounting unit
5 Telephone
10 Television receiving circuit
11 Antenna
12 Tuner
13 Auto-channel circuit
14 TV circuit
15 Display switching circuit
16 Program memory
17 Search circuit
18 Flag control circuit
19 Clock circuit
20 Character diagram information system receiving circuit
21 Line control unit
23 Modem
24 Modem controller
25 Videotex controller
26 Display memory

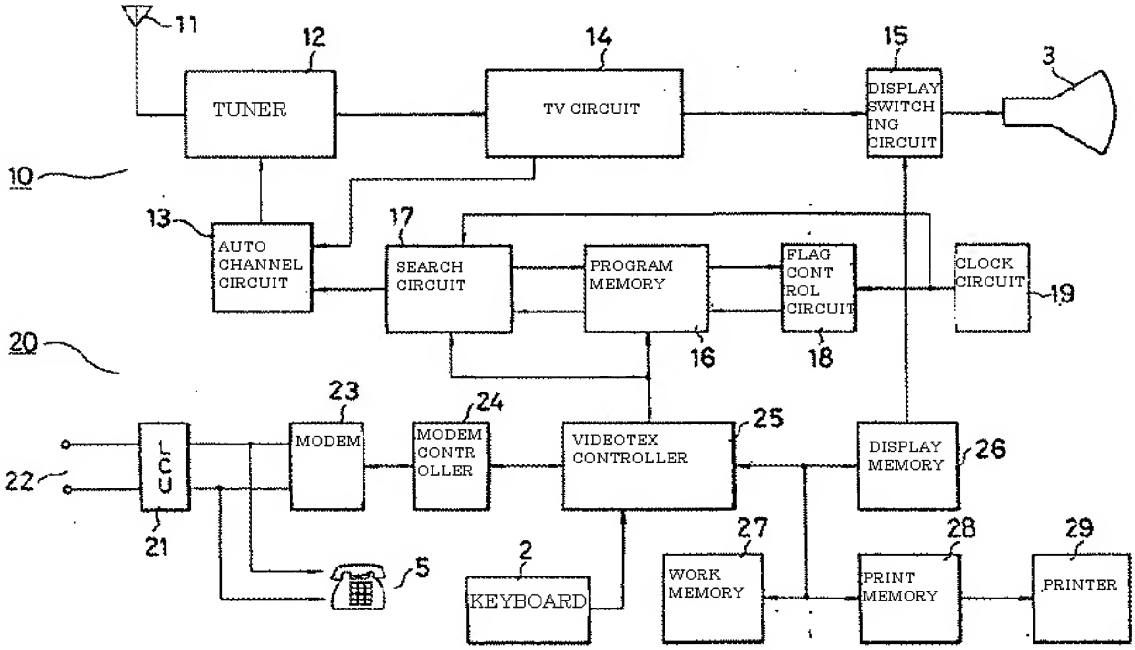
11
12
14
15
3
TUNER
TV CIRCUIT
DISPLAY SWITCHING CIRCUIT
10
13
17
AUTO CHANNEL CIRCUIT
SEARCH CIRCUIT
PROGRAM MEMORY
FLAG CONTROL CIRCUIT
CLOCK CIRCUIT
19
20
16
18
23
24
25
26
MODEM
MODEM CONTROLLER
VIDEOTEX CONTROLLER
DISPLAY MEMORY
22
CCT
21
27
28
29
5
2
KEYBOARD
WORK MEMORY
PRINT MEMORY
PRINTER

Fig.1

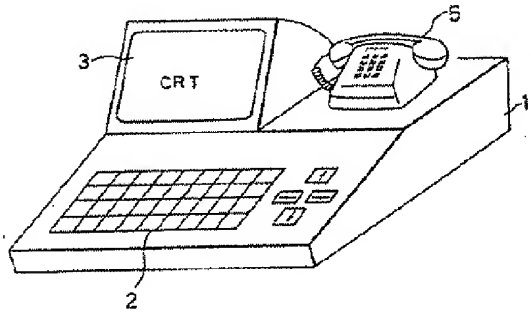
5
3
CRT
1
2

Fig.2

16

DATE	CHANNEL	DAY OF THE WEEK	START	END	TYPE	F1	F2	PROGRAM NAME
MAY 12	1 CH	SAT	6:00	6:15	NEWS			
MAY 12	1 CH	SAT	6:15	6:45	EDUCATION			
MAY 12	1 CH	SAT	6:45	7:20	NEWS			
MAY 12	1 CH	SAT	7:20	7:25	WEATHER FORECAST			
⋮	⋮	⋮	⋮	⋮	⋮			⋮
MAY 12	4 CH	SAT	13:00	16:30	BASEBALL			
⋮	⋮	⋮	⋮	⋮	⋮			⋮
MAY 12	6 CH	SAT	19:00	19:30	CARTOON			
MAY 12	6 CH	SAT	19:30	20:00	QUIZ			

Fig.3

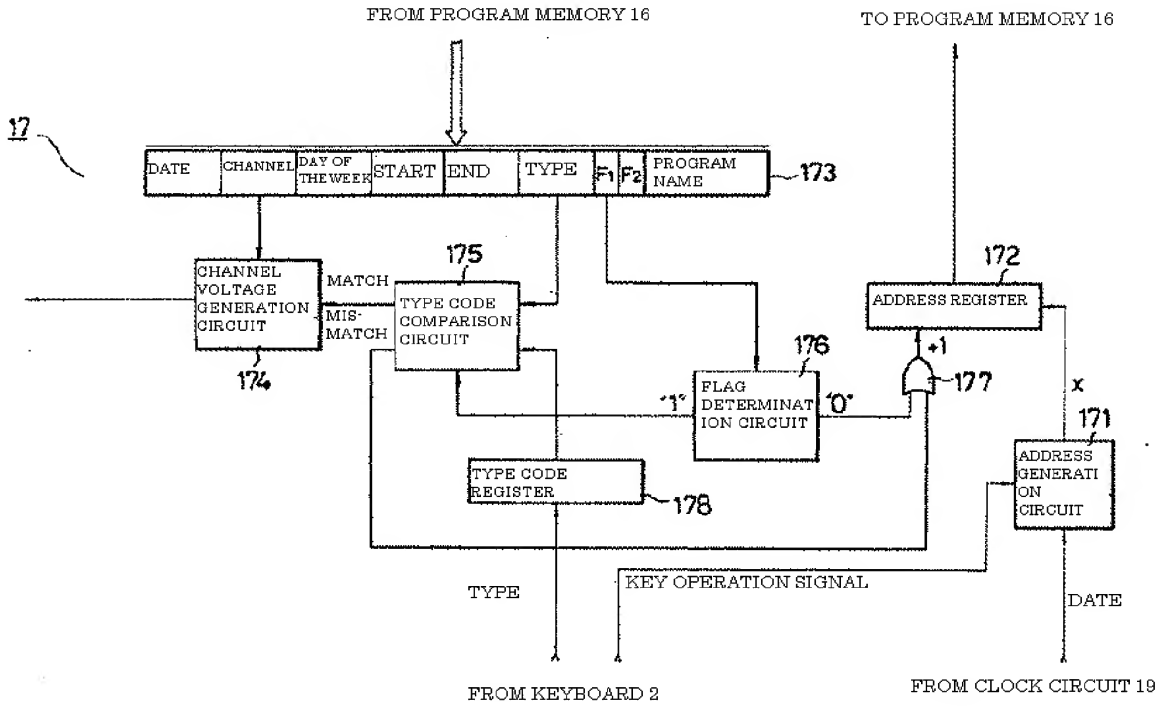
FROM PROGRAM MEMORY 16
TO PROGRAM MEMORY 16
17
DATE
CHANNEL
DAY OF THE WEEK
START
END
TYPE
F1
F2
PROGRAM NAME
173
CHANNEL VOLTAGE GENERATION CIRCUIT
MATCH
MIS-MATCH
175
TYPE CODE COMPARISON CIRCUIT
174
176
FLAG DETERMINATION CIRCUIT
"1"
"0"
177
+1
172
ADDRESS REGISTER
x
171
ADDRESS GENERATION CIRCUIT
TYPE CODE REGISTER
178
TYPE
KEY OPERATION SIGNAL
DATE
FROM KEYBOARD 2
FROM CLOCK CIRCUIT 19

Fig.4

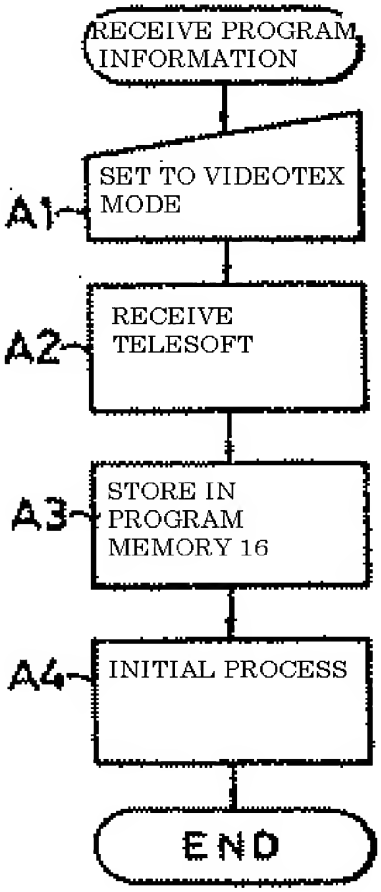
RECEIVE PROGRAM INFORMATION
A1
SET TO VIDEOTEX MODE
A2
RECEIVE TELESOFT
A3
STORE IN PROGRAM MEMORY 16
A4
INITIAL PROCESS
END

Fig.5

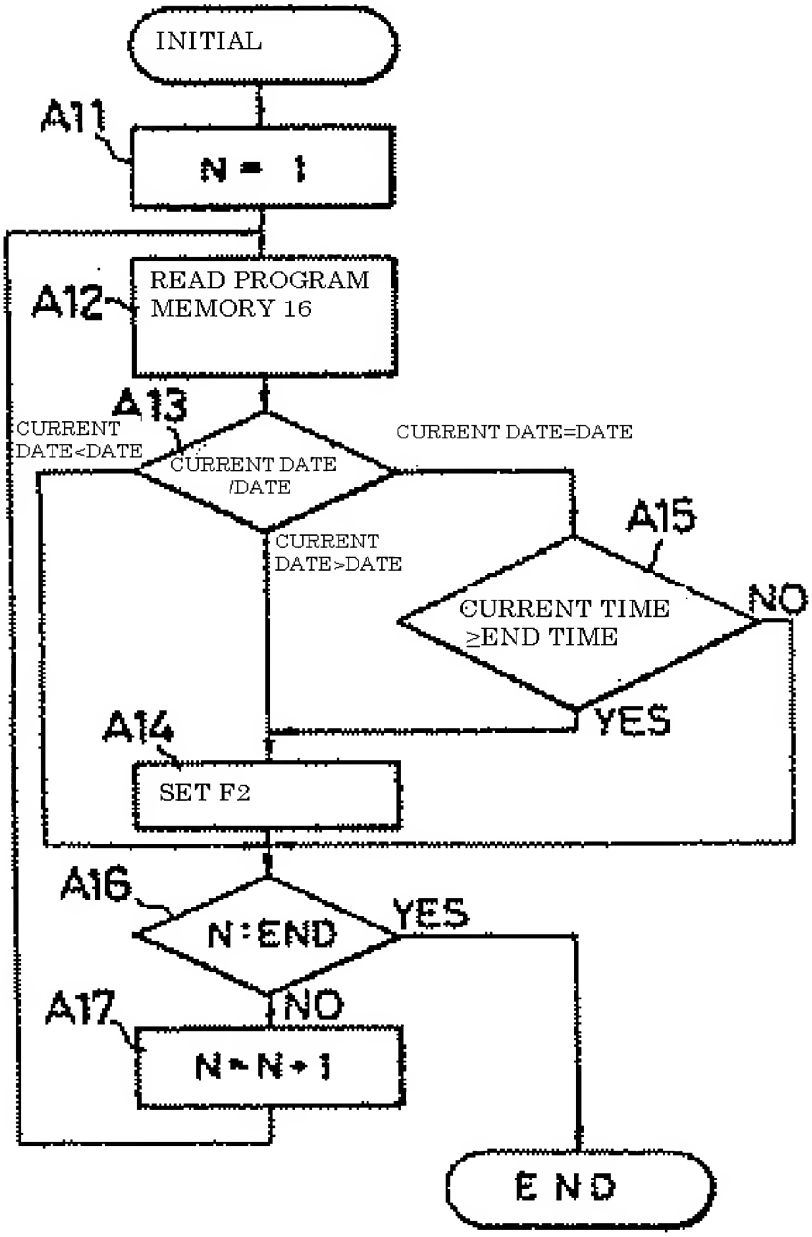
INITIAL
A11
N = 1
A12
READ PROGRAM MEMORY 16
A13
CURRENT DATE<DATE
CURRENT DATE /DATE
CURRENT DATE=DATE
CURRENT DATE>DATE
A15
CURRENT TIME ≥END TIME
NO
YES
A14
SET F2
A16
N:END
YES
NO
A17
N←N+1
END

Fig.6

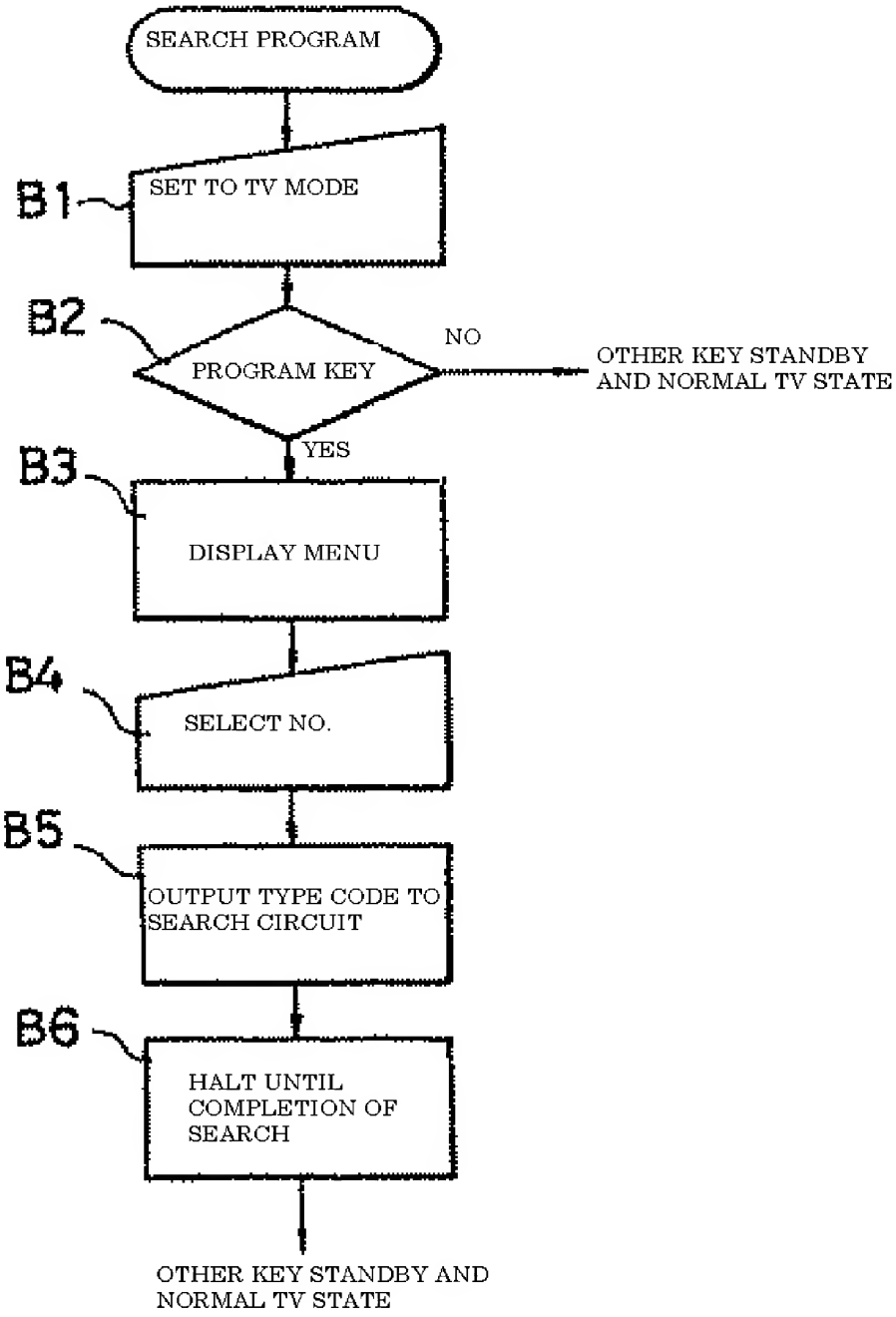
SEARCH PROGRAM
B1
SET TO TV MODE
B2
PROGRAM KEY
NO
OTHER KEY STANDBY AND NORMAL TV STATE
YES
B3
DISPLAY MENU
B4
SELECT NO.
B5
OUTPUT TYPE CODE TO SEARCH CIRCUIT
B6
HALT UNTIL COMPLETION OF SEARCH
OTHER KEY STANDBY AND NORMAL TV STATE

Fig.7

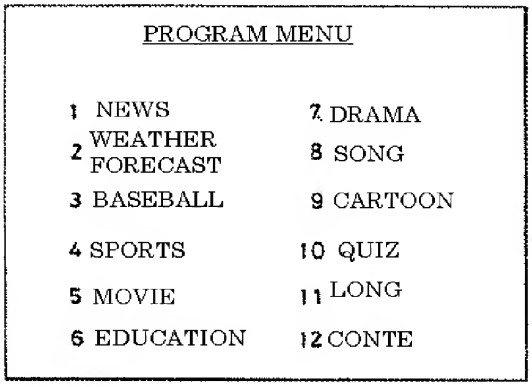
PROGRAM MENU
1 NEWS
2 WEATHER FORECAST
3 BASEBALL
4 SPORTS
5 MOVIE
6 EDUCATION
7 DRAMA
8 SONG
9 CARTOON
10 QUIZ
11 LONG
12 CONTE

Fig.8

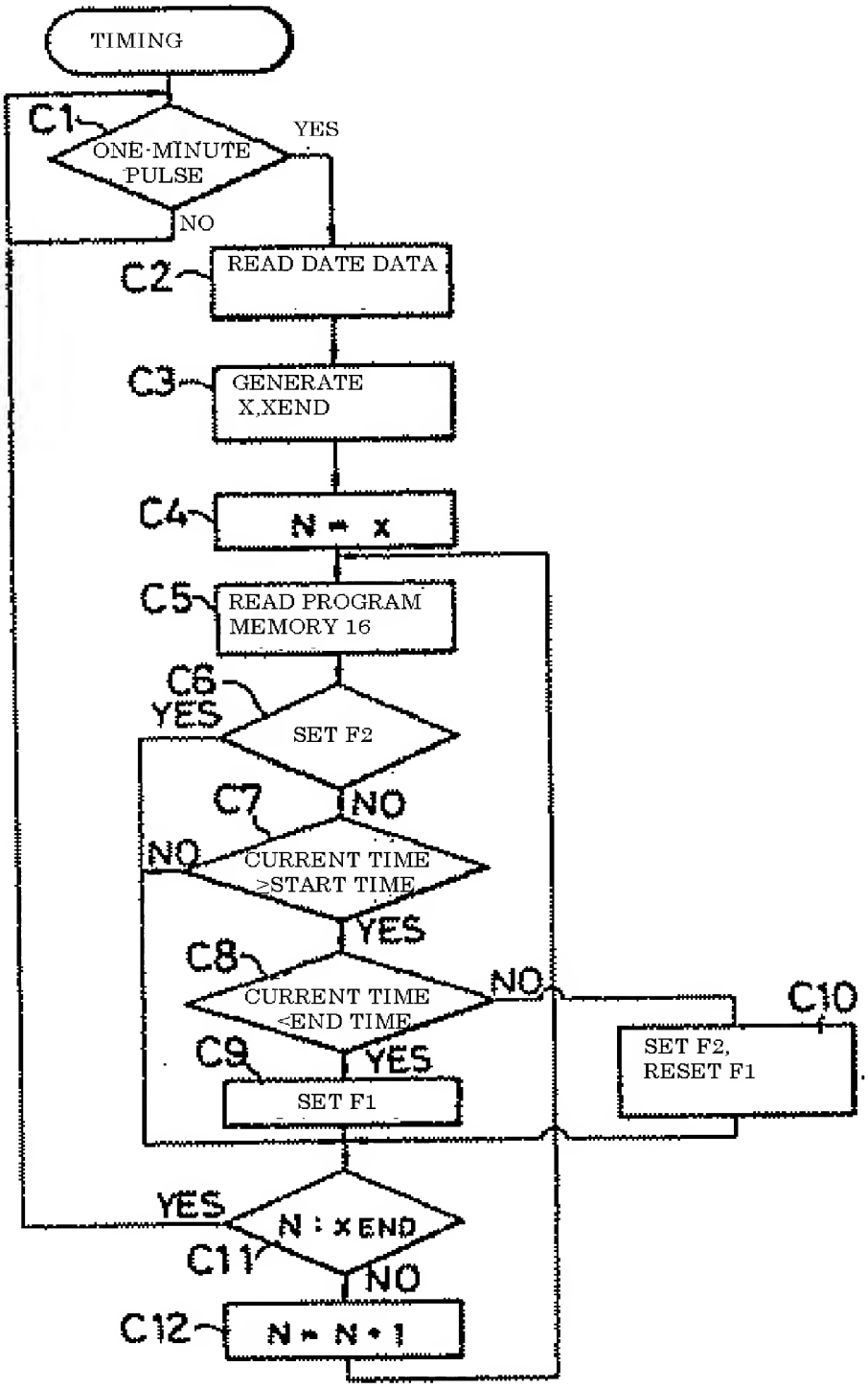
TIMING
C1
ONE-MINUTE PULSE
YES
NO
C2
READ DATE DATA
C3
GENERATE X,XEND
C4
N = X
C5
READ PROGRAM MEMORY 16
C6
YES
SET F2
C7
NO
NO
CURRENT TIME >START TIME
YES
C8
CURRENT TIME <END TIME
NO
C10
SET F2, RESET F1
C9
YES
SET F1
YES
N : X END
C11
NO
C12
N = N + 1

Fig.9

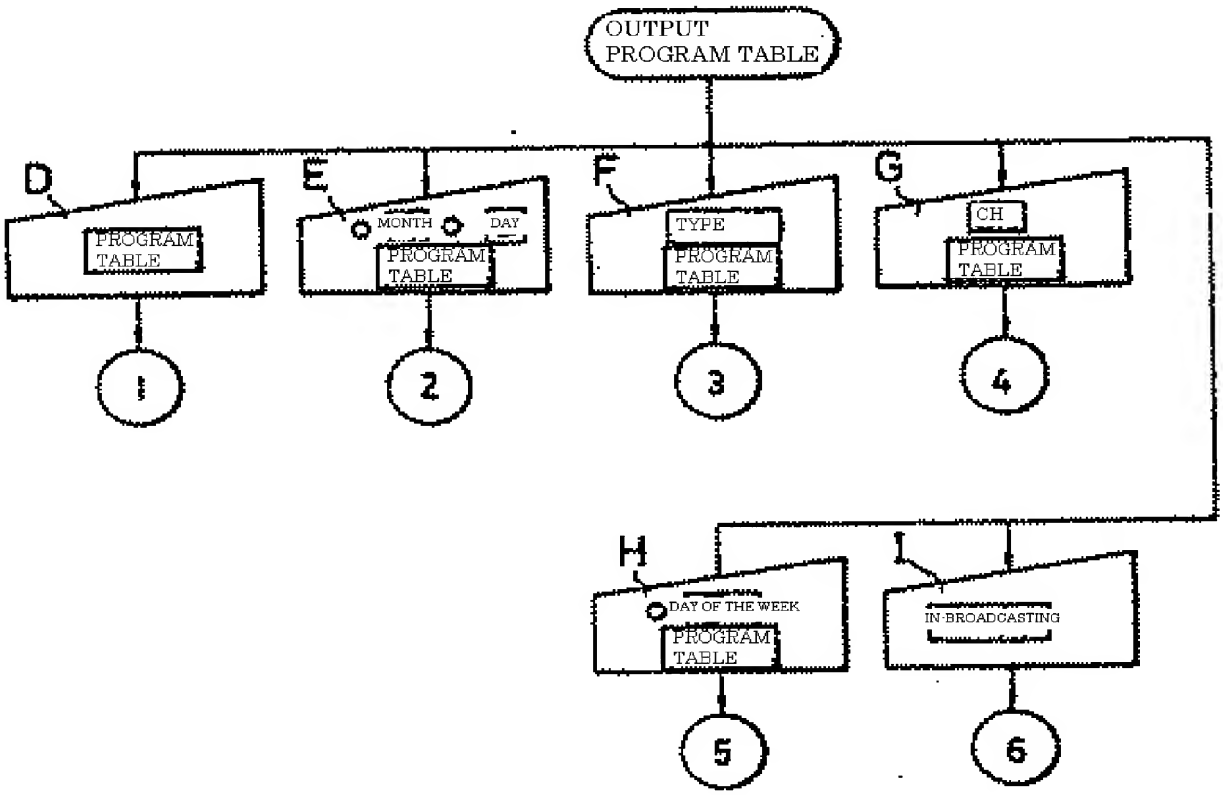
OUTPUT
PROGRAM TABLE
D
PROGRAM
TABLE
1
E
MONTH
DAY
PROGRAM
TABLE
2
F
TYPE
PROGRAM
TABLE
3
G
CH
PROGRAM
TABLE
4
H
DAY OF THE WEEK
PROGRAM
TABLE
5
I
IN-BROADCASTING
6

Fig.10

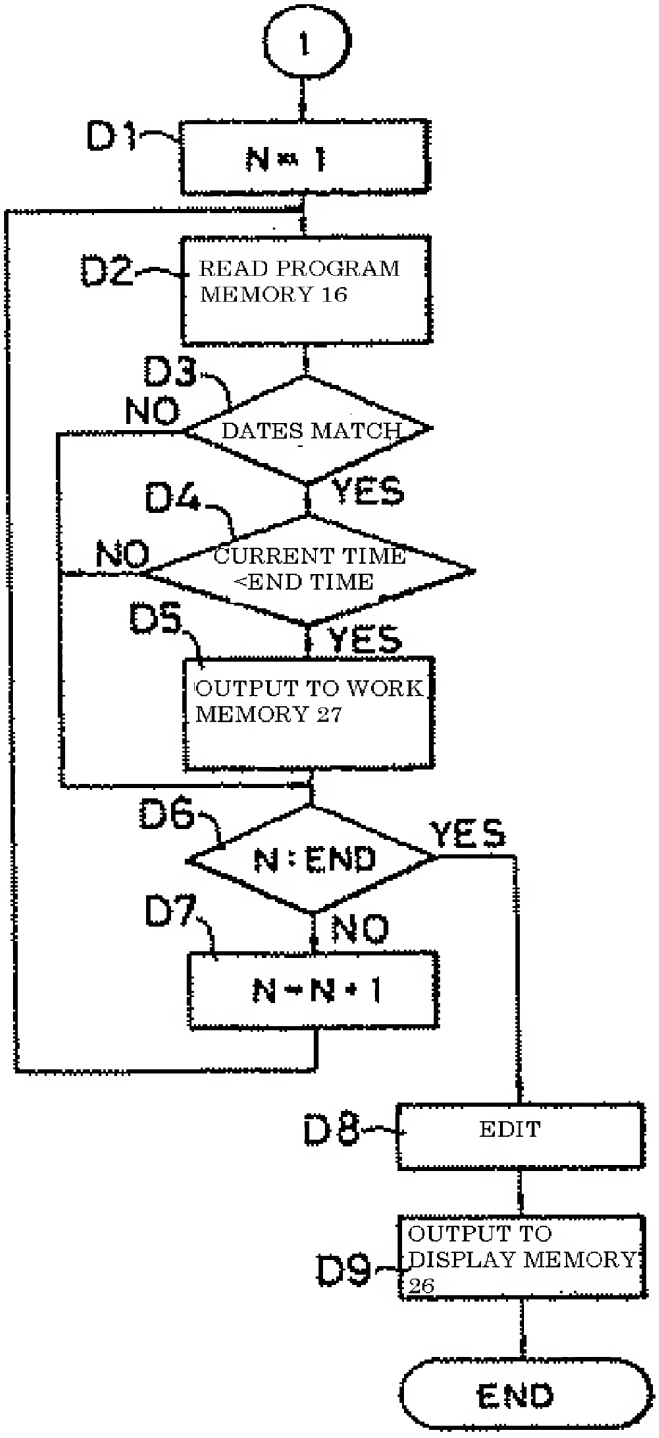
1
D1
N = 1
D2
READ PROGRAM MEMORY 16
D3
NO
DATES MATCH
YES
D4
NO
CURRENT TIME <END TIME
YES
D5
OUTPUT TO WORK MEMORY 27
D6
N : END
YES
D7
NO
N ← N + 1
D8
EDIT
D9
OUTPUT TO DISPLAY MEMORY 26
END

Fig.11

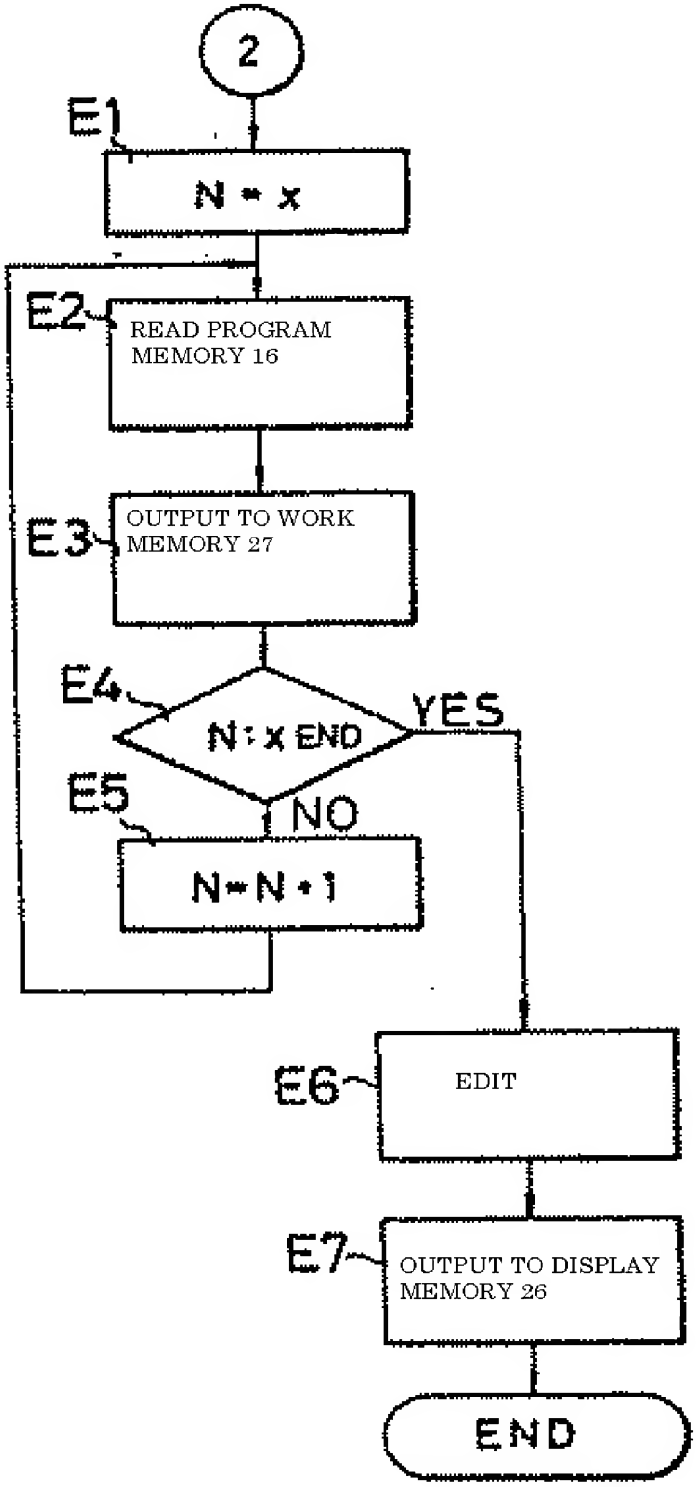
2
E1
N = x
E2
READ PROGRAM MEMORY 16
E3
OUTPUT TO WORK MEMORY 27
E4
N : x END
YES
E5
NO
N=N+1
E6
EDIT
E7
OUTPUT TO DISPLAY MEMORY 26
END

Fig.12

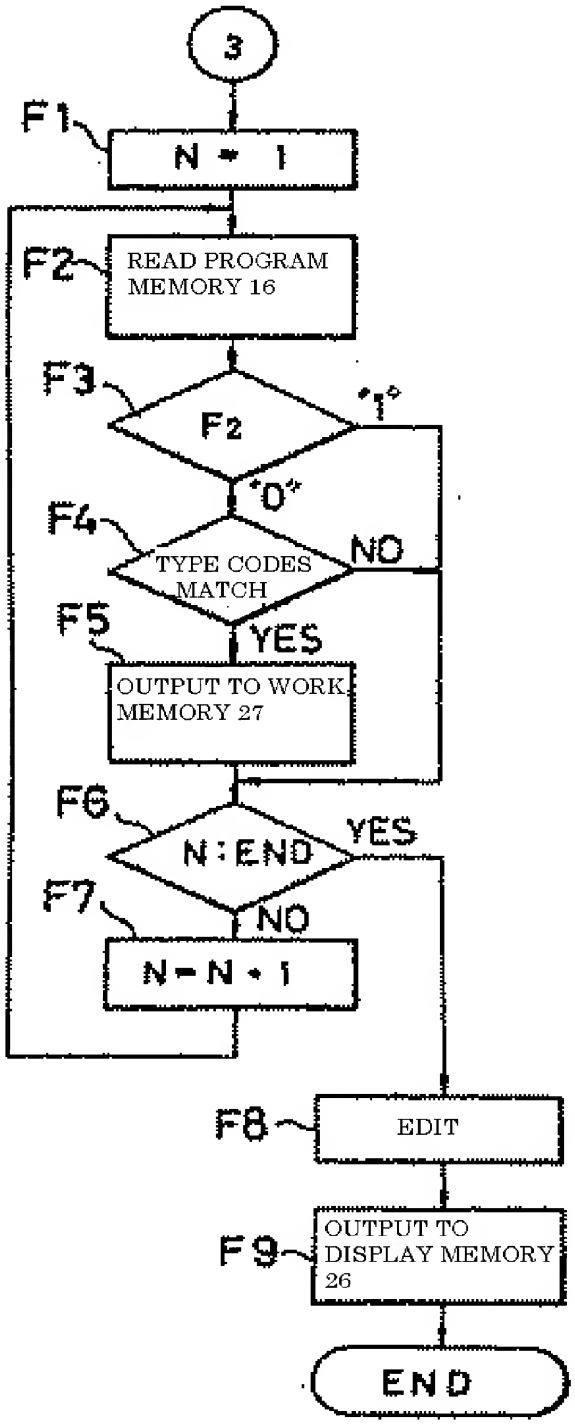
3
F1
N = 1
F2
READ PROGRAM MEMORY 16
F3
F2
"1"
"0"
F4
TYPE CODES MATCH
NO
F5
YES
OUTPUT TO WORK MEMORY 27
F6
N : END
YES
F7
NO
N = N + 1
F8
EDIT
F9
OUTPUT TO DISPLAY MEMORY 26
END

Fig.13

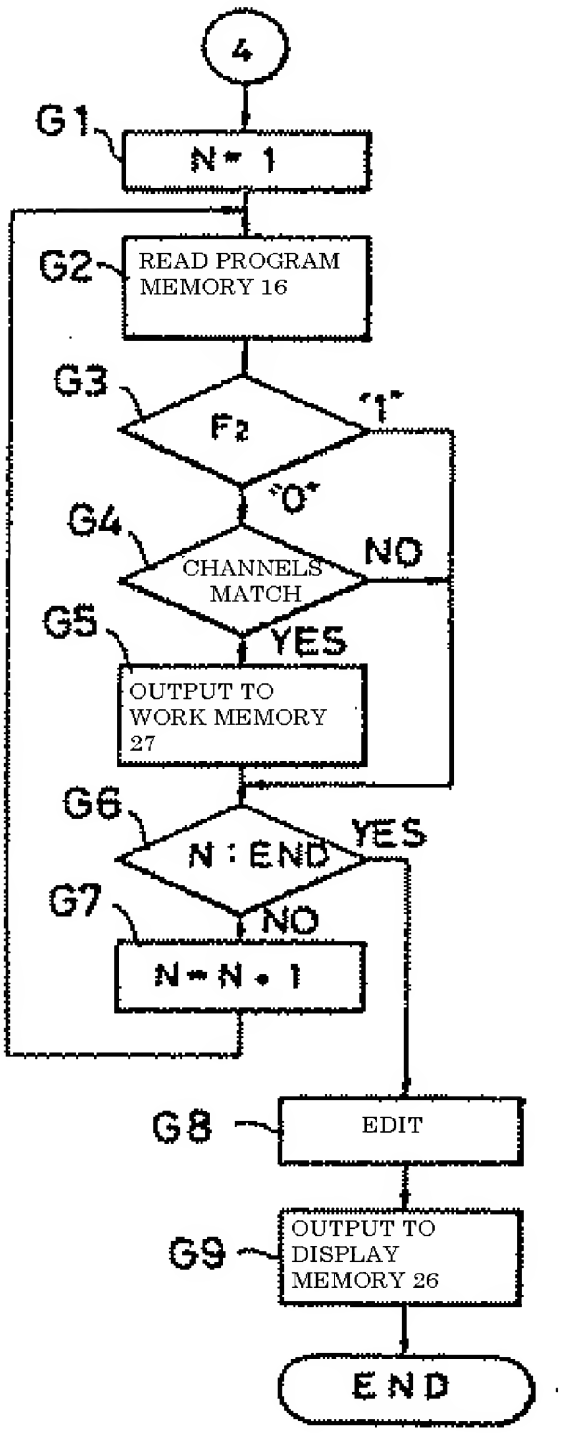
4
G1
N = 1
G2
READ PROGRAM MEMORY 16
G3
F2
"1"
"0"
G4
CHANNELS MATCH
NO
YES
G5
OUTPUT TO WORK MEMORY 27
G6
N : END
YES
G7
NO
N = N + 1
G8
EDIT
G9
OUTPUT TO DISPLAY MEMORY 26
END

Fig.14

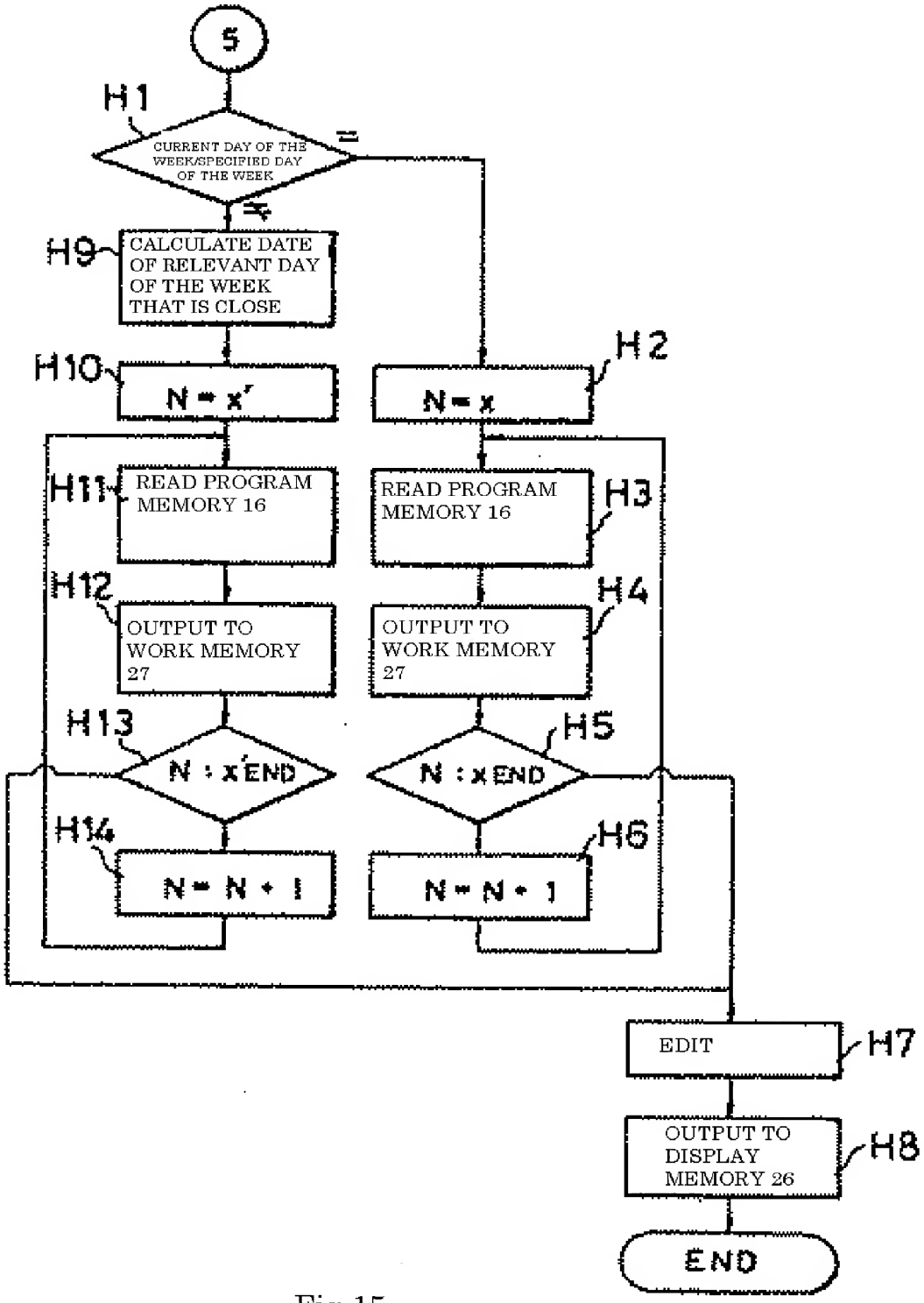
5
H1
CURRENT DAY OF THE WEEK/SPECIFIED DAY OF THE WEEK
≠
=
H9
CALCULATE DATE OF RELEVANT DAY OF THE WEEK THAT IS CLOSE
H10
N = x'
H2
N = x
H11
READ PROGRAM MEMORY 16
H3
READ PROGRAM MEMORY 16
H12
OUTPUT TO WORK MEMORY 27
H4
OUTPUT TO WORK MEMORY 27
H13
N : x'END
H5
N : xEND
H14
N = N + 1
H6
N = N + 1
EDIT
H7
OUTPUT TO DISPLAY MEMORY 26
H8
END

Fig.15

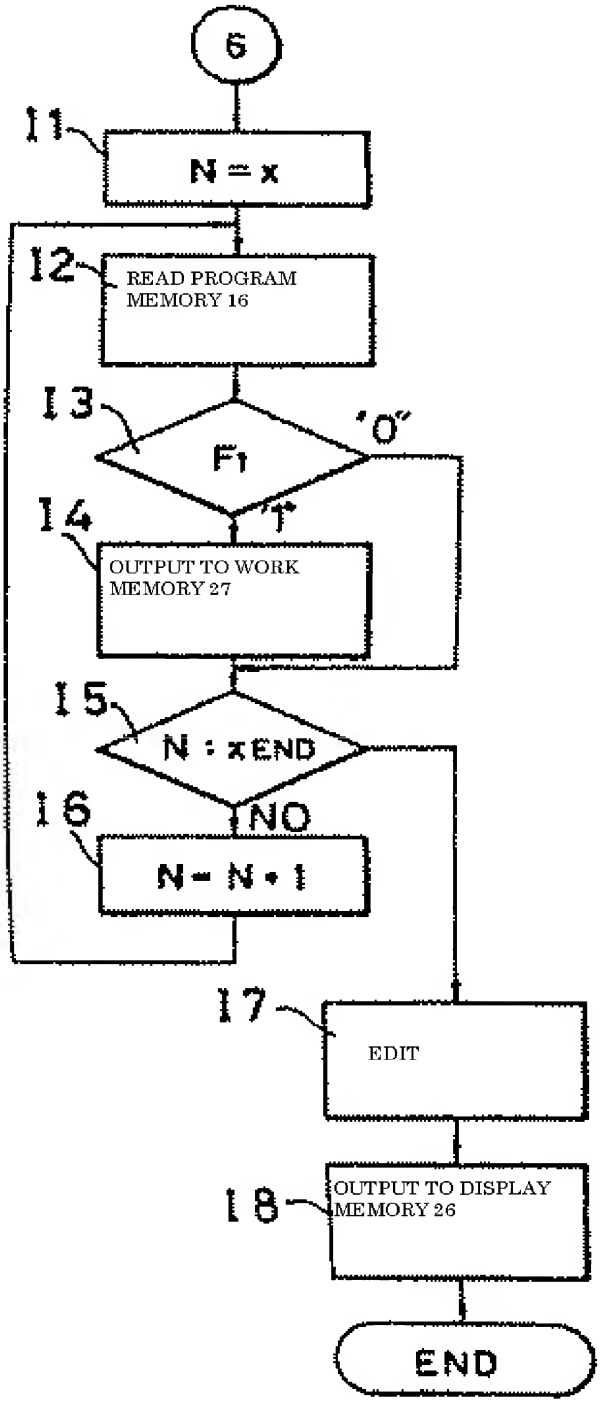
6
11
N = x
12
READ PROGRAM MEMORY 16
13
F1
"0"
"1"
14
OUTPUT TO WORK MEMORY 27
15
N : xEND
16
NO
N = N + 1
17
EDIT
18
OUTPUT TO DISPLAY MEMORY 26
END

Fig.16